## REMARKS

Claims 1, 7, 20, and 24 have been amended, and claims 43-45 have been added. Claims 1-16, 19-20, 22-30, 38-40, and 43-45 remain pending.

The Examiner has stated that claims 20 and 24, among other claims, would be allowable if rewritten into independent form including all of the limitations of the base claim and any intervening claims. Accordingly, claims 20 and 24 have been amended into independent form including all of the limitations of the base claim and any intervening claims.

The Examiner rejected claims 1, 2, 6, 10, 12-16, and 38-40 under 35 U.S.C. §103(a) as being unpatentable over Yang et al. (U.S. Patent No. 6,982,793) in view of Sezginer et al. (U.S. Patent Application No. 2005/0012928). Claims 7 and 8 are rejected under 35 U.S.C. §103(a) as being unpatentable over Yang et al. in view of Sezginer et al. further in view of Shiraishi et al. (U.S. Patent No. 5,966,201). Claims 7, 9, 19, and 29-39 are rejected under 35 U.S.C. §103(a) as being unpatentable over Yang et al. in view of Sezginer et al. in view of Johnson et al. (U.S. Patent No. 5,388,909). Claim 11 is rejected under 35 U.S.C. §103(a) as being unpatentable over Yang et al. in view of Sezginer et al. in view of Hignette et al. (U.S. Patent No. 5,191,393). Claim 25 is rejected under 35 U.S.C. §103(a) as being unpatentable over Yang et al. in view of Sezginer et al. in view of Johnson et al. further in view of Stirton (U.S. Patent No. 6,458,605).

Claim 1 is directed towards a "method for determining an overlay error between at least two layers in a multiple layer sample." Claim 1 also recites "using an optical system to measure a plurality of measured optical signals from a plurality of periodic targets on the sample, wherein the periodic targets each have a first structure in a first layer and a second structure in a second layer, wherein there are predefined offsets between the first and second structures." Claim 1 further recites "using a scatterometry overlay technique to analyze the measured optical signals of the periodic targets and the predefined offsets of the first and second structures of the periodic targets to thereby determine and store an overlay error between the first and second structures of the periodic targets, wherein the scatterometry overlay technique is a phase based technique that includes representing each of the measured optical signals as a set of periodic functions having a plurality of known parameters and a plurality of unknown parameters that include an unknown overlay error parameter and analyzing the set of periodic functions to solve for the unknown overlay error parameter to thereby determine the overlay error, wherein the number of periodic targets equals the number of unknown parameters."

A phase based scatterometry technique, in the manner claimed, may be preferred in some circumstances, depending on variables that may include scatterometry overlay target pitch, scatterometry overlay target design, scatterometry overlay (SCOL) target materials, the measured

scatterometry signal, and the like. Additionally, when the number of targets equals the number of unknown parameters for such phase technique, the area that is utilized for the targets can be significantly reduced, as compared with over determined systems that utilize targets that exceed the number of unknown parameters.

Although the primary reference Yang appears to be directed towards determining overlay by analyzing optical signals measured from targets having offsets, it is respectfully submitted that the teachings of Yang are based on a linear scatterometry technique and also fail to teach a phase technique for determining overlay such that the number of targets equals the number of unknown parameters, in the manner claimed.

The secondary references also fail to teach or suggest such phase based scatterometry technique, in the manner claimed. For instance, although the secondary reference Sezginer appears to teach a method of determining overlaying using a periodic function, it is respectfully submitted that Sezginer fails to teach or suggest a phase technique that "includes representing each of the measured optical signals as a set of periodic functions having a plurality of known parameters and a plurality of unknown parameters that include an unknown overlay error parameter and analyzing the set of periodic functions to solve for the unknown overlay error parameter to thereby determine the overlay error, wherein the number of targets equals the number of unknown parameters" as claimed in claim 1. Specifically, Sezginer teaches an over determined system, which results from utilizing a target number that is higher than the number of unknowns. See Paragraph [0128]. As a result of this over determined, Sezginer requires an optimization procedure to determine a best solution from the multiple solutions produced from the over determined periodic functions. This optimization procedure is described, for example, in Paragraph [0129]~[0133]. Accordingly, Sezginer fails to teach or suggest a phase technique for determining overlay, wherein the number of targets equals the number of unknowns, including overlay, in the manner claimed.

In light of the forgoing, it is respectfully submitted that independent claim 1 is patentable over the cited art.

The Examiner's rejections of the dependent claims are also respectfully traversed. However, to expedite prosecution, all of these claims will not be argued separately. Claims 2-16, 19, 22, 23, 25-30, 38-40, and 43-45 each depend directly or indirectly from independent claims 1, 20, or 24, therefore, are respectfully submitted to be patentable over cited art for at least the reasons set forth above with respect to claims 1, 20, or 24. Further, the dependent claims require additional elements that when considered in context of the claimed inventions further patentably distinguish the invention from the cited art. For example, claim 43 recites "the number of terms

in each set of periodic functions is three and the number of periodic targets is four" and claim 44 additionally recites specific requirements for the offsets that would result in a single good solution for the overlay determination. Claim 45 also recites specific requirements for the predefined offsets that would result in a single good overlay error determination. In contrast, Sezginer recites an over determined system that results in multiple solutions of overlay that require subsequent optimization procedures to find the correct overlay error value. Accordingly, since the cited art fails to teach such specific offsets in the manner claimed, claims 44 and 45 are further patentable over the cited art.

Applicant believes that all pending claims are allowable and respectfully requests a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

Respectfully submitted,
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